

3-3 What Are the Major Components of an Ecosystem?

- **Concept 3-3A** Ecosystems contain living (biotic) and nonliving (abiotic) components.
- **Concept 3-3B** Some organisms produce the nutrients they need, others get their nutrients by consuming other organisms, and some recycle nutrients back to producers by decomposing the wastes and remains of organisms.

Ecosystems Have Living and Nonliving Components

- **Abiotic**
 - Water
 - Air
 - Nutrients
 - Rocks, sand, soil, clay, gravel...
 - Heat
 - Solar energy
- **Biotic**
 - Living and once living

Major Biotic and Abiotic Components of an Ecosystem

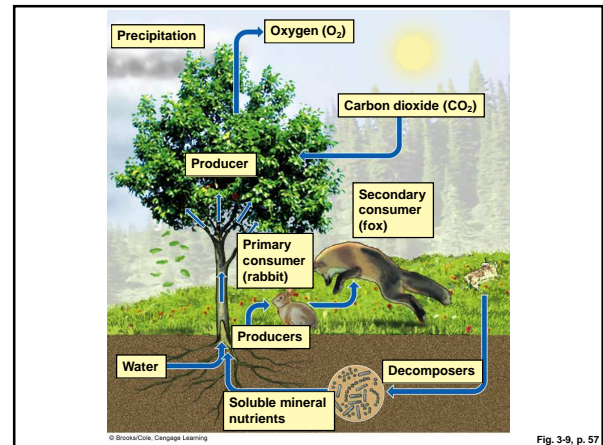
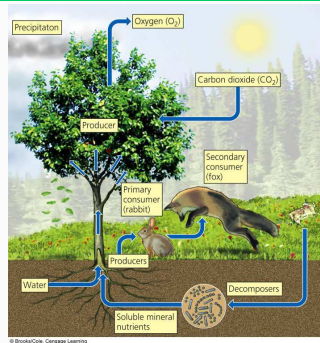


Fig. 3-9, p. 57

Range of Tolerance for a Population of Organisms

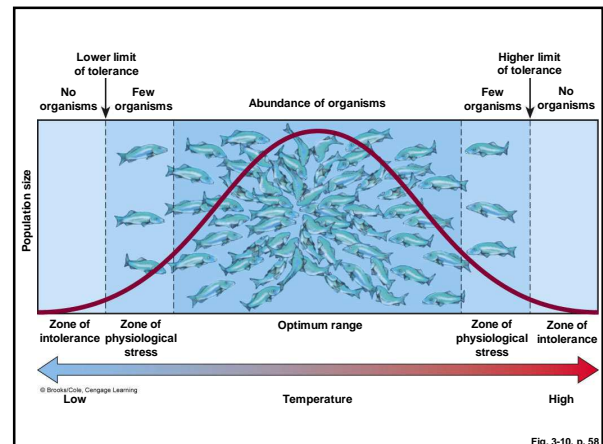
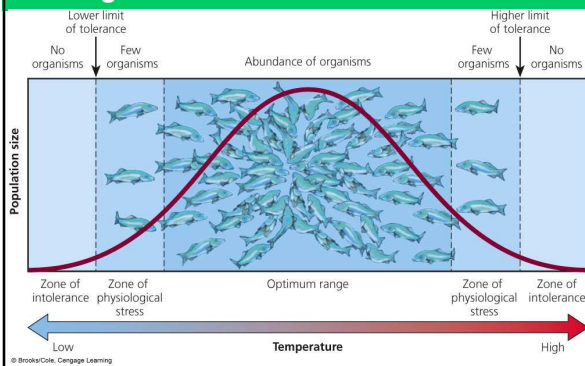


Fig. 3-10, p. 58

Several Abiotic Factors Can Limit Population Growth

- **Limiting factor principle**
 - Too much or too little of any abiotic factor can limit or prevent growth of a population, even if all other factors are at or near the optimal range of tolerance

Producers and Consumers Are the Living Components of Ecosystems (1)

- **Producers, autotrophs**
 - Photosynthesis
 - Chemosynthesis
- **Consumers, heterotrophs**
 - Primary
 - Secondary
 - Third and higher level
- **Decomposers**

Producers and Consumers Are the Living Components of Ecosystems (1)

- **Producers, autotrophs**
 - Photosynthesis – store sun's energy in chemical bonds
 - Plants, algae
 - Chemosynthesis – store energy from a natural gradients (temperature or chemical) into chemical bonds
 - Ex: Strange organisms deep in the ocean by hydrothermal vents

Consumers

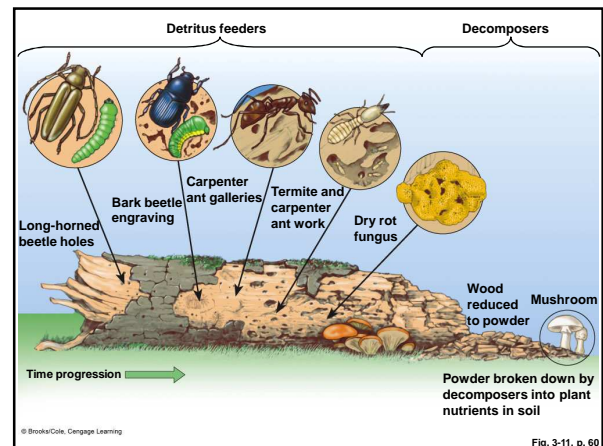
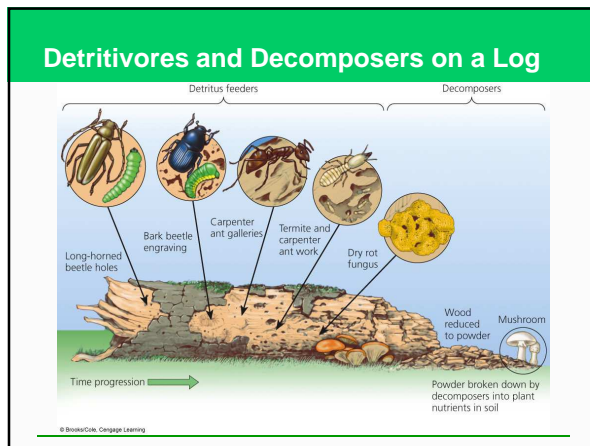
- **Consumers, heterotrophs**
 - Primary – eat producers
 - Ex: Caterpillar, rabbit, grasshoppers
 - “Herbivores”
 - Secondary – eat primary consumers
 - Ex: Blue Jay (bird),
 - “Carnivores” or “omnivores”
 - Third and higher level
 - Ex: Hawk (Bird of prey)

Consumers, continued

- **Decomposers**
 - Primarily bacteria and fungi
 - Return nutrients from dead plants and animals back into the soil for producers to re-use
 - They can secrete enzymes that speed up the break-down of bodies of dead organisms into nutrient compounds (water, CO₂, minerals, etc...)

Consumers, continued

- **Detritivores**
 - “Detritus feeders” eat the waste or dead bodies of other organisms (“detritus”)
 - Ex: Mites, earthworms, catfish, some insects, and vultures (“scavengers”)



Two types of cellular respiration

- **Aerobic respiration**
 - Metabolic process that uses O_2 to break glucose down into CO_2 and H_2O
- **Anaerobic respiration, fermentation**
 - Metabolic processes in the absence of O_2
 - Can produce ethanol, methane, acetic acid, hydrogen sulfide...instead of CO_2 and H_2O
 - These are the “stinky” processes!

Exit Ticket

- **Make a simple food web for YOURSELF today – are you an omnivore, a carnivore or an herbivore?**

Energy Flow and Nutrient Cycling Sustain Ecosystems and the Biosphere

- **One-way energy flow**
- **Nutrient cycling of key materials**